CLAIMS

What is claimed is:

1. An ultrasonic transducer, comprising:

a plurality of micro-machined ultrasonic transducer (MUT) elements formed on a first substrate, the first substrate including a first surface and a second surface; and

a plurality of vias associated with each MUT element, where the vias reduce the propagation of acoustic energy traveling laterally in the first substrate.

2. The transducer of claim 1, wherein the vias are etched into the first substrate.

3. The transducer of claim 2, wherein the vias are etched into the first surface of the first substrate and the second surface of the first substrate.

4. The transducer of claim 3, wherein the vias taper between the first surface of the first substrate and the second surface of the first substrate.

5. The transducer of claim 1, wherein the first substrate comprises two portions and the vias are etched into each portion so that each via is larger in diameter at the second surface of each portion than at the first surface of each portion.

6. The transducer of claim 5, wherein the second surface of each portion is joined together.

7. The transducer of claim 6, wherein the vias taper in diameter between the first surface and the second surface of the first and second portions.

8. The transducer of claim 2, further comprising a second substrate joined to the first substrate and wherein the vias are etched into the second substrate.

9. The transducer of claim 2, wherein the vias include a first portion having a first diameter extending from the first surface of the first substrate toward the second surface of the first substrate and a second portion having a varying diameter extending from the second surface of the first substrate toward the first surface of the first substrate.

10. A method for reducing the lateral propagation of acoustic energy in an ultrasonic transducer, the method comprising the steps of:

forming a plurality of micro-machined ultrasonic transducer (MUT) elements on a first substrate, the first substrate including a first surface and a second surface; and

forming a plurality of vias proximate to each MUT element such that the vias reduce the lateral propagation of acoustic energy in the first substrate.

11. The method of claim 10, further comprising the step of etching the vias into the first substrate.

12. The method of claim 11, further comprising the step of etching the vias into the first surface of the first substrate and the second surface of the first substrate.

13. The method of claim 12, further comprising the step of tapering the vias between the first surface of the first substrate and the second surface of the first substrate.

14. The method of claim 10, further comprising the steps of:

forming the first substrate in two portions, each portion including a first surface and a second surface;

etching the vias into each portion so that each via is larger at the second surface of each portion than at the first surface of each portion; and

joining the second surface of each portion together.

15. The method of claim 14, further comprising the step of tapering the vias between the first surface and the second surface of the first and second portions.

16. The method of claim 11, further comprising the steps of:

forming a second substrate associated with the first substrate; and

etching the vias into the second substrate.

17. The method of claim 11, further comprising the steps of:

forming the vias to include a first portion having a first diameter extending from the first surface of the first substrate toward the second surface of the first substrate; and

forming the vias to include a second portion having a varying diameter extending from the second surface of the first substrate toward the first surface of the first substrate.